

Conventional Heavy (CHV) Pool Quality Specifications

Quality Specifications for Component Streams to the Conventional Heavy (CHV) Pool								
Quality	Units	Min	Max	Typical*	Pool Typical Ex- Superior**	Referee Test Method	Test Frequency	Enbridge Response to Crude Not Meeting Quality Specs
Existing Specifications								
Density (15C)	kg/m ³	≥904	≤940			ASTM D4052	Frequency: AR ²	Delayed shut-in ⁶
Viscosity	cSt	≥100	≤350			ASTM D7042	Frequency: QR ⁴	Delayed shut-in ⁶
Olefins, total ¹	wt%		<1			H NMR	Frequency: R ⁷	Immediate shut-in ⁵
Vapour Pressure (VPCR _{4.1} @ 37.8 C)	kPa		95,103 ⁸			ASTM D6377	Frequency: QR ⁴	Immediate shut-in ⁵
S&W	vol%		0.5			ASTM D4007	Frequency: AR ²	Immediate shut-in ⁵
Organic Chlorides ¹	wppm		<1			ASTM D4929	Frequency: QR ⁴	Immediate shut-in ⁵
Component Typicals								
Resid (+980F)	mass% recovere			>39	40	ASTM D7169	Frequency: MR ³	Notification Process ⁶
TAN ⁹	mgKOH/g		≤1.1	<1.1	1.1	ASTM D664 & ASTM D664 CCQTA modified	Frequency: MR ³	Reclassification Process ⁶
Nickel	mg/L			<70	47	ASTM D5708-05	Frequency: MR ³	Notification Process ⁶
Vanadium	mg/L			<160	117	ASTM D5708-05	Frequency: MR ³	Notification Process ⁶
Deemed Butane	vol%			<3	2.3	ASTM D7169	Frequency: MR ³	Notification Process ⁶

*The expected or anticipated crude quality of individual components, understanding the fact that there may be, on occasion, variability outside of the range of the typical.

**The estimated crude quality of a pool is based on a limited number of random composite samples of batches ex-Superior, timeframe July 2014 – March 2015.

Notes

- For these properties, blending should not occur.
- AR: All Receipts of CHV component streams tested using weekly composite.
- MR: Monthly Random testing of CHV component streams.
- QR: Quarterly Random testing of CHV component streams. Upon violation perform probational testing at Enbridge discretion.
- Immediate shut-in upon identifying violation. Request third party Certificate of Analysis prior to subsequent receipt.
- Upon violation, notification to applicable party, increase monitoring. Consequence based on outcome of increased monitoring.
- R: Random testing. 2015 – Twice per year; 2016 onwards – Annually.
- Max 95kPa May 1st through Sept 15th
Max 103kPa Sept 16th through Apr 30th
- Heavy High TAN Crude: TAN > 1.1 mgKOH/g
Heavy Crude: TAN ≤ 1.1 mgKOH/g